

4.2. WATER NEEDS OF CATTLE

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INTRODUCTION

Water is an essential component in animal feed, but it is seldom discussed when nutrient requirements are considered. Water also plays a role in the management of the animals. This chapter explains the occurrence of water in feeds, its functions in the animal body, and it briefly discusses aspects of other use of water on farm. It also elaborates problems associated with water shortage and water requirements in relation to farmers perceptions on need and difficulties encountered to provide adequate water.

WATER IN ANIMALS AND PLANTS

The principal nutrients of feedstuffs are water, organic and inorganic matter. As the animal uses water for all its vital needs, it may be appropriate to term water as an essential nutrient, just like protein, energy and minerals. In fact, animals can better tolerate lack of food than lack of water.

The animal body is composed of two-thirds water, the proportion of water being higher in younger animals (8-10 months, 70-75%) and gradually

reduces as the animal grows older (18-20 months, 40-45%). As animals mature, the proportion of protein in the carcass remains almost constant but, the fat content varies. As the fat content of the body increases, the water content decreases. Fat animals may contain less than 50% water, whereas thin animals may contain 60-70% water. The water requirement of the animals could be met by:

- water consumed voluntarily,
- water present in feeds/fodders,
- water formed within the body due to metabolic oxidation (metabolic water)

The water is excreted or lost from the animal body through saliva, urine, faeces, milk and evaporation from the skin or respiration. The loss of water is influenced by the composition of diet, water intake and the physiological status of the animal. The latter depends on the environmental temperature and the stress on the animal.

Water in the animal serves:

- as a medium to transport nutrients and minerals;
- as a carrier for excreting the waste products;
- in maintaining body temperature;
- in maintaining the acid-base balance;
- as a medium for digestion and metabolism;
- as a major component of milk;
- as a lubricant to prevent friction in joints;
- in diluting the toxic associative factors of feed;

The water content in plants/feeds can differ considerably. It can be as high as 90% in feeds like water hyacinth or very succulent grasses, 70-80% in green fodders and between 5-15% in dry feeds like straws and concentrates. The water content of plants decreases with stage of maturity. Water in plants serves to transport nutrients to and from leaves to roots, to maintain the rigidity of the plant and as a medium for the various biochemical reactions.

WATER REQUIREMENTS

As is the case with other nutrients, the requirement for water depends on factors, like:

- animal species,
- environmental conditions,
- type of food eaten, i.e. amount of dry matter ingested
- physiological state of the animals (maintenance, growth, lactation, work).

Young calves receiving milk diets consume greater amounts of water in relation to the dry matter of their diet, than older cattle fed on dry feeds such as straws. Lactating animals require the greatest amount of water in proportion to their live weight as water constitutes 85 to 90% of the milk they yield. A cow yielding 12 litres per day secretes over 10.5 litres of water in the milk, and for every litre of milk produced about 3 litres of water is said to be required, apart from what the animal needs for its body function (Table 1). Working bullocks require more water as compared to the non working bullocks as they lose much water through respiration due to work.

Table 1. Optimum water intake depending on ambient temperatures for dairy cows in warm climates

Milk Yield (kg)	Ambient temperature			
	11-20°C		> 20°C	
	Body weight (kg)			
	350	600	350	600
0	46	63	56	77
10	58	86	70	105
20	69	98	84	119
30	81	109	98	133
40	98	120	119	147

Water intake = liquid + food moisture kg/day

Source: Oliver, 1987 (cited by Matthewman, 1994)

The extent to which animals can tolerate dehydration and their efficiency of regulating water needs, differ widely between species. For example, cattle have limited ability in this respect, compared to camels, but exotic breeds of cattle have greater difficulty to cope with water shortage than as most native breeds.

The type of feed also influences water intake. Grazing on low quality pastures results in reduced water intake. As the dry matter intake of large cattle is greater than that of smaller breeds under the same environmental and physiological conditions, also the volume of water consumed increases with increasing body size. Animals fed on straws treated with sodium hydroxide will increase their water intake as the sodium needs to be excreted in the urine. A similar situation arises if too much salt is offered or mixed in animal feeds. Cattle drink more water on a high-protein than on a

low-protein diet, since the nitrogenous end products need a greater urine volume for excretion. Diets with high levels of indigestible fibre (straws, matured grass) result in increased loss of water in faeces and animals fed such diets have an increased water intake.

The water intake increases with the ambient temperature. An animal kept under cool conditions (below 20°C) usually need 4-5 litres of water for every kg of dry matter eaten. But once the temperature rises above 30°C, the amount of water needed increases to 10-12 litres per kg dry food. Cows consume less water under humid than under arid/dry conditions. Water loss varies with the temperature. At 20°C more water is lost through faeces and urine and at temperatures above 30°C the loss is more through body surface followed by urine and respiratory tract.

Frequency of providing water is also important. Animals having free access to water drink more and yield more milk than those offered water only once a day. Normally, lactating cows drink 2-5 times daily and providing water 3 times a day would be quite sufficient. Frequency of watering can also affect milk composition. Animals deprived of water overnight, when offered water in the morning drank copiously but, seldom drank again during the day. This increased intake of water in the morning caused increased water content in the evening milk. Cattle deprived of water showed marked decrease in their feed intake by fourth day and lost weight equivalent to 16 per cent of their live weight. Water deprivation in lactating cows causes severe reduction in milk yield after the first 24 hours, probably also due to an associated reduction in feed intake (#3.2.): (non-)lactating cattle and sheep show reduced feed intake when deprived of water. The faeces

becomes dry and deprivation of water can lead to loss of weight in growing calves.

Animals receiving drinking water once a day or once in two days in a hot dry climate show depressed feed intake relative to animals receiving water at least twice in a day. Animals should be prevented from drinking water from lakes/ponds that contain high algal growth because they are sometimes poisoned when they drink such water.

Apart from meeting the water requirement through feeds, and voluntary consumption, the water formed within the body due to metabolic processes is another important source of water for animals. For example, one kilo of carbohydrate when metabolised in the body produces half of its quantity (500 ml) as water. Similarly 1 kilo of fat gives about 1000 ml of water and 1 kilo of protein about 400 ml as water.

Providing water

There is no doubt that animals should have a free access to clean drinking water, but in areas with scarcity of water, the water has to be used judiciously and priorities have to be set. For example, lactating and pregnant animals should be given priority over young animals and bullocks; crossbred animals should be given priority over local breeds, and sick animals should be given priority over healthy animals.

Water needs other than for drinking

Apart from drinking purposes, water is required for activities like bathing of animals and cleaning of sheds. Many animals are sprinkled with water and their udders washed before milking. This not only helps in cooling the animal body but, also to maintain hygiene. Water/swamp buffaloes often require water ponds/tanks for wallowing, and many farmers are reluctant to maintain buffaloes where they had no tanks or ponds in their villages. The water needs of animals may therefore be much more than normally estimated. Like with many other farm activities, it is often the women and children who have to heavy work like the carrying of water. Before suggesting changes in management, their ideas should be taken into account.

CONCLUSION

The water intake of animals are partly supplied through feed and partly through water consumed voluntarily. The physiological state of the animals influences the water intake. Variation exists between animals and factors such as nature of the feed and environmental temperature can affect water needs. There is no clear advantage in restricting water intake (other than in places where water is scarce. As the advantages of providing drinking water are many, animals should be provided with clean drinking water at least twice a day, according to the conditions and availability of water.

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